

Similar Shapes and Scale Factors

Compare your reasoning, not just the final result. Equivalent correct methods are welcome.

Public practice with published answers. This is not a full-topic readiness assessment.

1. A rectangle is 4 cm by 3 cm. Enlarge it by scale factor 2. Find the new dimensions and explain why both must change.

Worked solution 1: The enlarged rectangle is 8 cm by 6 cm.

1. Length: $4 \times 2 = 8$ cm.
2. Width: $3 \times 2 = 6$ cm.
3. Changing only one dimension would change the side ratio and usually the shape.

Image: cm



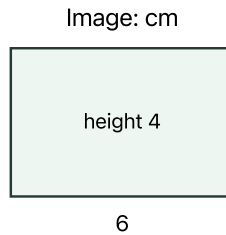
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Answer: factor two

2. A 15 cm by 10 cm photograph is reduced by scale factor 0.4. Find its new dimensions.

Worked solution 2: The reduced photograph is 6 cm by 4 cm.

1. Multiply both dimensions by 0.4.
2. $15 \times 0.4 = 6$ cm and $10 \times 0.4 = 4$ cm.
3. A factor between 0 and 1 makes every length smaller.



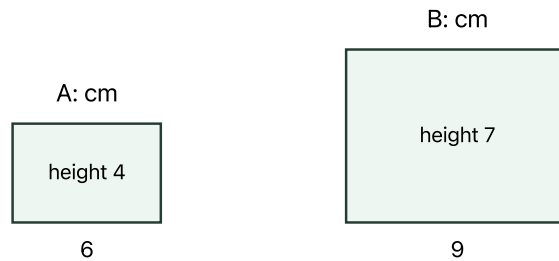
Answer: reduced photograph

3. Triangle A has sides 5 cm, 7 cm and 8 cm. Triangle B has corresponding sides 15 cm, 21 cm and 24 cm. Are they similar? Show all three ratios.

Worked solution 3: Yes. Each corresponding side ratio is 3.

1. $15 \div 5 = 3$.
2. $21 \div 7 = 3$ and $24 \div 8 = 3$.
3. All three side lengths have the same multiplier, so the triangles are similar.

4. A rectangle is 6 cm by 4 cm. Another is 9 cm by 7 cm, with long sides corresponding. Are they similar? Explain.



Compare corresponding sides

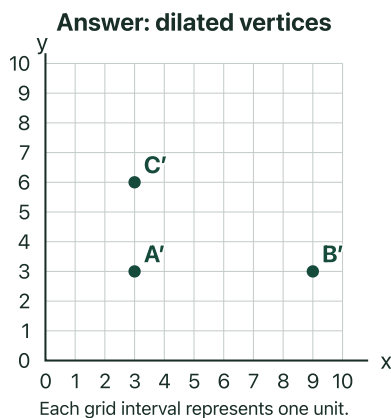
Worked solution 4: No: the length factors are 1.5 and 1.75.

1. Long-side factor: $9 \div 6 = 1.5$.
2. Short-side factor: $7 \div 4 = 1.75$.
3. There is no single scale factor for both dimensions.

5. Dilate triangle A(1, 1), B(3, 1), C(1, 2) from the origin by scale factor 3. Plot the image and compare the horizontal and vertical leg lengths.

Worked solution 5: A'(3, 3), B'(9, 3), C'(3, 6). The legs change from 2 and 1 units to 6 and 3 units.

1. Multiply both coordinates of each vertex by 3.
2. $A' = (3, 3)$, $B' = (9, 3)$, $C' = (3, 6)$.
3. Horizontal leg: $2 \times 3 = 6$. Vertical leg: $1 \times 3 = 3$. Matching length ratios preserve the triangle's shape.

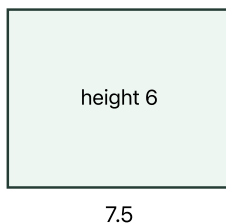


6. A 5 cm by 4 cm rectangle is enlarged by length scale factor 1.5. Find the new dimensions, both areas and the area scale factor.

Worked solution 6: New dimensions: 7.5 cm by 6 cm. Areas: 20 cm² and 45 cm². Area factor: 2.25.

1. Multiply lengths: $5 \times 1.5 = 7.5$ and $4 \times 1.5 = 6$.
2. Original area: $5 \times 4 = 20 \text{ cm}^2$. New area: $7.5 \times 6 = 45 \text{ cm}^2$.
3. $45 \div 20 = 2.25 = 1.5^2$ because two dimensions each scale by 1.5.

Image: cm



Answer: enlarged rectangle